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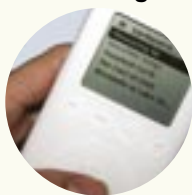
Aquatic Sciences Chronicle

www.aqua.wisc.edu/chronicle

UNIVERSITY OF WISCONSIN SEA GRANT INSTITUTE UNIVERSITY OF WISCONSIN WATER RESOURCES INSTITUTE

INSIDE:

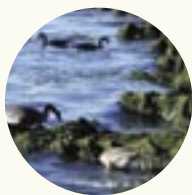
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A NEW SOURCE OF WATER NEWS

We are pleased to introduce the *Aquatic Sciences Chronicle*, the newsletter of the Aquatic Sciences Center at the University of Wisconsin–Madison. The ASC is the administrative home of the UW Sea Grant Institute and the Water Resources Institute.

The *Chronicle* will keep you informed about Sea Grant and Water Resources work and notify you about funding opportunities, conferences, and more.

We hope you find this newsletter interesting and useful—and we welcome your comments. Please send them to chronicle@aqua.wisc.edu.

SEA GRANT

Trouble under the Boardwalk

**MYSTERIOUS
CORROSION
DRAWS
EXPERTS TO
DULUTH-SUPERIOR
HARBOR**

Chad Scott was on a routine inspection dive in the Duluth-Superior Harbor a few years ago when he came face to face with a problem—one big enough to put his fist through.

“I’ve seen some corrosion here and there at other Great Lakes ports, but nothing like this,” he said. Scott saw that some of the beams supporting the dock structures “had holes the size of a softball.”

Subsequent inspections revealed that corrosion is widespread throughout the harbor on all types of steel piling buttressing the docks. Scott found that most of the steel is covered with small pits, scooped out in diameters of 1/4 to 1 inch, primarily in the first four to six feet below the waterline and tapering off around 10 feet.

Scott, a marine and structural engineer and a commercially certified diver, began working with the Duluth Seaway Port Authority to learn more about the problem. By comparing older and newer sheet pile installations, they determined that sometime in the 1970s the rate of corrosion in the harbor shifted into high gear.

PITTED AGAINST TIME

The accelerated corrosion could have significant safety and financial implications for the port, which handles the largest total cargo volume in the Great Lakes. Thirteen miles of steel sheet piling are corroding around the harbor, and if the problem isn’t addressed, the structural integrity of docks and loading facilities could be compromised and the failing steel would have to be replaced.

“This is potentially a very costly problem,” said James Sharrow, facilities manager of the Duluth Seaway Port Authority. “We have about 90 to 100 million dollars of possible repairs in our harbor to steel that’s being damaged by corrosion.”

The Port Authority requested federal and state funding for a \$250,000 study of the problem. Meanwhile, Gene Clark, UW Sea Grant coastal engineering specialist, and Jeff Gunderson, Minnesota Sea Grant associate director, began assembling a steering committee to look for help in narrowing down the list of possible culprits.

EXPERTS WEIGH IN

Last September, five experts in corrosion, microbiology, and chemistry visited the harbor to look for the root of the corrosion problem. All of them were surprised by what they saw.

“In seawater areas we see sheet pile fall apart in 10–20 years all the time,” said James Bushman, president and principal corrosion engineer of Bushman & Associates, Inc., a consulting firm in Medina, Ohio. “But this is a freshwater harbor, and that’s normally a much less aggressive environment, but it doesn’t appear to be in this case.”



Experts recommended further studies to link the corrosion problem in the Duluth-Superior Harbor to its causes.

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The Aquatic Sciences Center is the administrative home of the **University of Wisconsin Sea Grant Institute** & **University of Wisconsin Water Resources Institute**.

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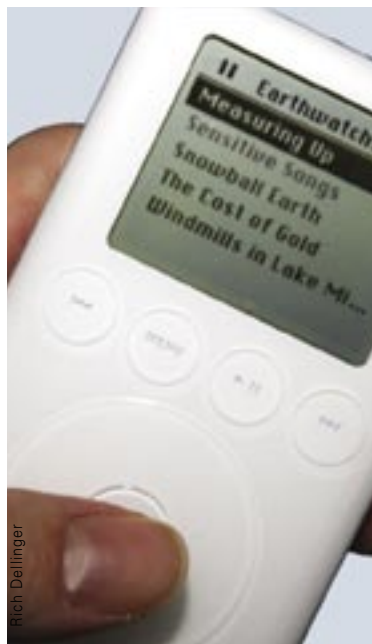
University of Wisconsin Sea Grant Institute is part of a national network of 30 university-based programs funded through the National Sea Grant College Program, National Oceanic & Atmospheric Administration, U.S. Department of Commerce, and through matching contributions from participating states and the private sector. www.seagrants.wisc.edu

University of Wisconsin Water Resources Institute is one of 54 Water Resources Research Institutes nationwide authorized by the federal Water Resources Research Act and administered through the U.S. Geological Survey. www.wri.wisc.edu



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Visit the *Earthwatch Radio* site at ewradio.org for more information about its RSS feed and podcast.

FEATURED WEB SITE Earthwatch Radio Launches Podcast

A new type of broadcasting has made it possible to listen to Earthwatch Radio anytime, anywhere. And you don't even need a radio.

Podcasting, a technology barely a year old, is changing the way people produce and hear audio programs. Just as anyone can create a Web page for the world to read, podcasts allow anyone to record an audio program and broadcast it over the Internet for all who care to listen.

The twist with podcasting is that a software program automatically searches for and downloads broadcasts. The result is a customized play list of music, news, and talk radio programs. The broadcasts can be downloaded to a computer or any MP3 player, such as an iPod (which unofficially lent its name to the technology). With iPods running as small as a pack of gum, listeners can not only choose what they want to hear, they can listen whenever or wherever is most convenient.

Earthwatch officially began podcasting in December. Since then, over 30,000 podcasts have been downloaded. Earthwatch was one of the first scientific and environmental programs to be listed on several podcast directories, such as *Podcast.net* and *iPodder.org*.

people news

Lubner to Serve as National Chair

Education coordinator Jim Lubner is the new chair-elect for the nationwide Sea Grant Education Steering Committee. The committee allows education specialists throughout the Sea Grant network to speak with one voice at the national level. Lubner will represent his colleagues at the Sea Grant Association and at Sea Grant Extension assemblies.

Born's Career Celebrated with Style

Steve Born officially retired in January, but friends and colleagues from around the world recently gathered to celebrate his more than 30 years as professor with the UW-Madison Urban and Regional Planning Department and UW-Extension. The two-day symposium, entitled "Environmental Planning: Roads Traveled and Pathways to the Future," featured panel sessions on Wisconsin lakes, shoreland, and groundwater management, including addresses from Dane County Executive Kathleen Falk, Madison Mayor Dave Cieslewicz, and UW-Extension Emeritus Dean Ayse Somersan.

A Measure of Our Thirst

GREAT LAKES
REGION
PILOTS NATIONAL
WATER USE
STUDY

The Great Lakes region has been selected by the U.S. Geological Survey for a pilot study of the nation's water availability and use, and much of the work will focus on Lake Michigan and its drainage basin, according to USGS scientists.

The study will look at water usage, groundwater recharge, and groundwater and surface water quantities and flow, said William Alley, chief of the USGS Office of Groundwater in San Diego, Calif.

Ultimately, the goal is to develop indicators that can help policymakers and planners assess the availability of groundwater and surface water throughout the country, added Dan Feinstein, a hydrologist at the Wisconsin district of the USGS who is heading the groundwater component of the study.

The study began in February, and work will continue for a year or more, Alley said.

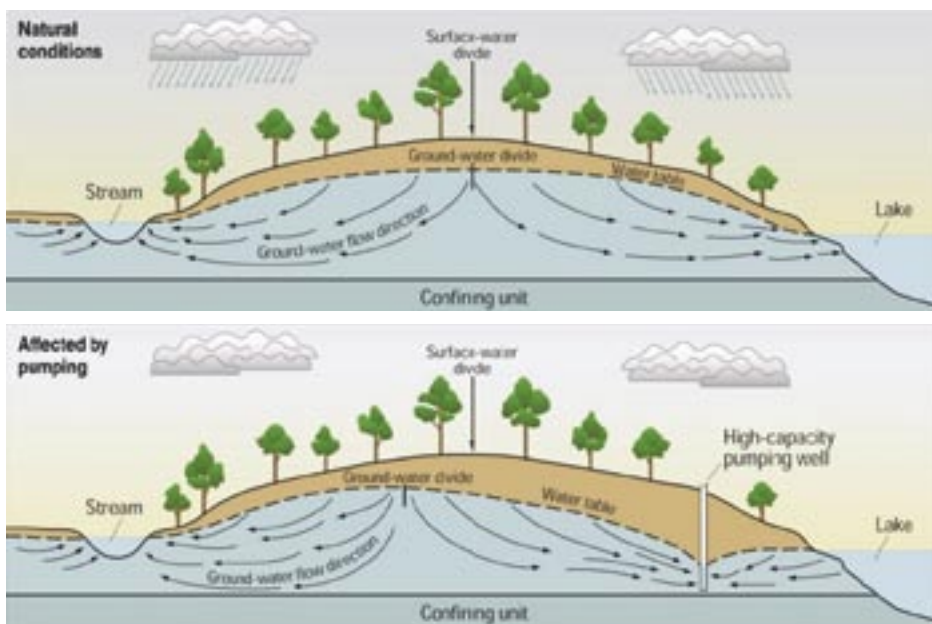
The study will look at the entire Great Lakes basin, but much of the effort will focus on Lake Michigan, Alley said, in part because it's the only one of the Great Lakes to lie entirely within the U.S. border, which simplifies some logistics.

A driving factor in selecting the Great Lakes region was that a lot of data have already been collected in the area, Alley said.

In Wisconsin, a "substantial part" of that work was funded through the Wisconsin Groundwater Research and Monitoring Program, according to Jim Hurley, assistant director of the UW Water Resources Institute. The groundwater program is a cooperative effort among the University of Wisconsin System (via the Water Resources Institute), the Wisconsin Department of Natural Resources, and the Department of Agriculture, Trade and Consumer Protection.

The pilot study will synthesize much of the data already collected in the region into a single, coherent picture of water availability and use throughout the Great Lakes Basin. It will not entail much original field work, Alley said.

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Like rivers and streams, groundwater flows in certain directions (A). Heavy pumping can change those directions and reduce available water (B).



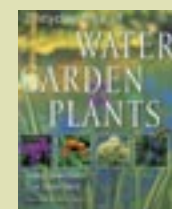
Wisconsin's WATER LIBRARY

It's spring and time for gardening. If you are interested in adding a water feature to your yard or garden, Wisconsin's Water Library has a number of suggested titles at www.aqua.wisc.edu/waterlibrary/books_ponds.asp. Any Wisconsin resident can check out books for free. The books are sent to your local public library for pickup and return. Some available books are:



The Master Book of the Water Garden. Philip Swindells. Boston: Bullfinch Press, 2002.

A comprehensive guide to building and maintaining water features that offers inspiration and a wealth of practical ideas and tips for both amateur and experienced gardeners.



Encyclopedia of Water Garden Plants. C. Greg and Sue Speicher. Portland, Oregon: Timber Press, 2004.

This is the definitive guide to the full range of plants available to water gardeners.



Simple Fountains for Indoors and Outdoors: 20 Step-by-Step Projects. Dorcas Adkins. Pownal, Vermont: Storey Books, 1999.

Adkins tells readers everything they need to know to create elegant, soothing water fountains for their homes or gardens.

Thirst continued from page 3

Other reasons for choosing the Great Lakes area for the pilot study included the region's water diversion issues and proposed revisions to the Great Lakes Charter, known as Annex 2001, several researchers said.

Annex 2001, which is currently being negotiated, would establish clear procedures for approving proposed withdrawals of Great Lakes waters.

As part of the pilot study, Feinstein and others will expand a groundwater model they developed for southeast Wisconsin (see wi.water.usgs.gov/glpf). The new model will encompass the entire Lake Michigan basin, which constitutes roughly half the drainage basin of the entire Great Lakes, Feinstein said.

Development of the southeast Wisconsin groundwater model was largely funded by the Southeastern Wisconsin Regional Planning Commission.

USGS originally requested \$4.2 million from Congress to conduct two pilot studies. The second one was to be the lower Colorado River basin. However, Congress allocated only \$1.2 million, making only one study possible. The agency is hoping to begin the Colorado and other pilot studies eventually, if and when funding permits.

For more information, please see the USGS report, "Concepts for National Assessment of Water Availability and Use," water.usgs.gov/pubs/circ/circ1223. —JK



Floating Classroom

Nine Wisconsin students studied marine science Jan. 5-19 in the Bahama Islands. Their "classroom" was the Denis Sullivan, a three-masted wooden schooner operated by Pier Wisconsin and based in Milwaukee most of the year. Their professor was Sea Grant Education Coordinator James Lubner. Here, Malerie Tanner, a sophomore in journalism and mass communications at UW-Milwaukee, offers some reflections on her experiences.

I was a little intimidated when I first boarded the *S/V Denis Sullivan*, but I realized right away that the crew was trustworthy and knew a lot about their ship. Certain sounds made their ears perk up. They understood them like other people know the noises of their home. I felt safe knowing they all were there to guide me through this learning experience.

My first major adjustment onboard was to my sleeping patterns. The rolling of the boat was strangely comforting, and every night the waves rocked me to sleep. Often I was awakened in the middle of the night to stand watch for four to five hours. Watch included steering the ship, raising or striking the sails, routine boat checks and, of course, telling stories. In our spare time, we took water samples and sent measurements of pH, dissolved oxygen, and temperature back to Pier Wisconsin in Milwaukee. My favorite part of those late shifts was standing at the bow to watch for other boats. There is nothing quite as peaceful as looking out into the darkness and staring the waves and stars in the face.

Life onboard quickly settled into a routine. Each day at 2 p.m. we had an all-hands-on-deck meeting to review the day. Then Dr. Lubner and Meridith, the ship's



education assistant, would teach lessons on sailing and marine science. That was our cycle for two weeks, and while it may sound repetitive, each day brought new challenges and experiences.

When I returned to Milwaukee, many people asked me, “Did you learn anything, or was it more like a vacation?” I always answered that it was the best dang vacation I’ve ever had, due to the amount that I learned.

One of the most important lessons I learned was acceptance. Living in such tight quarters and depending on each other so much, you can’t just walk away from a person if your personalities don’t match. On a boat, you make them match.

There is a saying that “a day is a week, and a week is a day” onboard a schooner. I couldn’t agree more. Striking sails in the morning seemed forever ago, but seeing a whale a week ago seemed like it was yesterday. It is hard to distinguish between the days on a boat because every experience, whether it was an hour ago or a week ago, is so special that the memory stays fresh in your mind forever. — *Malerie Tanner*



The SV Denis Sullivan, anchored off Lee Stocking Island in the Bahamas. On the island, students visited the Caribbean Marine Research Center, one of six national undersea research centers supported by the National Oceanic and Atmospheric Administration. (Top left) Malerie Tanner looks down from the crosstrees on the Denis Sullivan’s main mast. On the last day of the trip, students climbed the ship’s ratlines under crew supervision.

From Earthwatch Radio to Habitat Protection



Knauss Fellow
Diane Pansky

Wisconsin Sea Grant is pleased to announce that Diane Pansky was selected as Wisconsin's 2005 Dean John A. Knauss Marine Policy Fellow. Pansky began work in February in NOAA's Habitat Restoration and Protection Program in Silver Spring, Md.

"The office I work in coordinates all of NOAA's habitat protection and restoration efforts," Pansky said. "That includes everything from major oil spill clean-ups to community-based restoration projects. My work focuses mainly on program planning and budgeting, so it's pretty behind the scenes, but it's giving me an opportunity to see the marine policy process in action."

Pansky has two master's degrees from the University of Wisconsin-Madison. She earned one last May in conservation biology and sustainable development, and the other in political science several years earlier.

As part of her degree work, Pansky interned with the IUCN—The World Conservation Union, based in Gland, Switzerland. She assisted the organizers of the governance stream of the World Parks Congress, held in Durban, South Africa, in September 2003.

While earning her recent master's degree, Pansky worked as a UW Sea Grant project assistant, writing Earthwatch Radio scripts. The experience solidified her interest in marine conservation and led her to apply for the Knauss Fellowship.

"Working for Earthwatch Radio gave me a much richer understanding of the value of the oceans and the complexity of marine ecosystems," Pansky said. "I'm very pleased to have this opportunity to contribute to NOAA's coastal and marine conservation work through the fellowship program."

A Stinkin' Mess



Julie Kinzelman

HEAPS OF ALGAE, LOADS OF QUESTIONS

Despite much research, it's not clear why massive mats of algae have been fouling Lake Michigan beaches in recent years. Suspects include increasing phosphorus, zebra mussels, lower lake levels, and other factors. Whatever the cause, getting rid of the ugly, foul-smelling stuff isn't easy.

Those were the take-home messages from a public forum on the issue held Feb. 18 in Cleveland, Wis. The day-long event was sponsored by Wisconsin Sea Grant, the Department of Natural Resources and UW-Extension. About 100 people, including scientists, homeowners, beach managers and concerned citizens, filled an auditorium at Lakeshore Technical College.

Erika Jensen, an environmental scientist at the UW-Milwaukee Great Lakes WATER Institute, presented research showing that *Cladophora* often contains high levels of *E. coli* and other pathogens, and that it prolongs their survival.

Many scientists addressed the role phosphorous may play in promoting algae growth. Erica Young, a biologist at the UW-Milwaukee Great Lakes WATER Institute, was one of several scientists who presented research indicating that phosphorous already in the lake's water and sediments, rather than new inputs, may be spurring *Cladophora* growth. Vicky Harris, UW Sea Grant water quality specialist, pointed out that roughly two-thirds of all phosphorous in the lake is harbored in the sediments and recycled each year. Even so,

phosphorous input into the lake is the only factor that people can significantly control, Harris said.

Several scientists noted that zebra mussels have dramatically altered nutrient cycling in the lake by removing phosphorous from the water and concentrating it on the lake bottom where they live. The mussels also increase water clarity, allowing more light to reach *Cladophora*, and they provide a hard surface for *Cladophora* to grow on.

John Berges, a UW-Milwaukee biologist, suggested other relevant factors might include changing wind patterns, water temperatures and currents, and lake levels.

People have tried many ways to control *Cladophora* since the 1950s, when it first became a problem on the Great Lakes. These have included removing it with machines, killing it with chemicals, speeding its decomposition with bacteria or fungi, and masking the odor with lime. However, these approaches have been too expensive, impractical, or even counterproductive where they have been tried, reported DNR Water Resource Management Specialist John Masterson.

Scientists at the DNR and the UW-Milwaukee WATER Institute are planning more research this summer to better understand the roles of phosphorous, zebra mussels, water clarity, temperature, wind and water currents, and other factors in producing excessive algae.

A more detailed summary of the Feb. 18 forum will be posted soon at <http://seagrant.wisc.edu/waterquality>.

The proceedings of a Dec. 8 workshop at the WATER Institute for scientists, beach managers and policy makers can be found at www.uwm.edu/Dept/GLWI/cladophora.



specialist Gene Clark

Trouble under the Boardwalk continued from page 1

Bushman and the other experts concurred that the corrosion is unusual and needs to be formally studied. They also quickly ruled out many of the possible causes, leaving only a few to be examined in more detail.

Microorganisms like bacteria or fungi could be eating away at the steel, or stray current from a high-voltage direct-current line could be speeding up the corrosion. Another possibility is that the harbor's water chemistry might have changed in ways that promoted corrosion. Highway de-icing salts may have added significant amounts of chloride to the harbor. Also, as water quality improved with tougher legislation like the 1972 Clean Water Act, higher amounts of dissolved oxygen in the harbor could have boosted corrosion rates.

MOVING FORWARD

In addition to testing the possible causes, the panel recommended measuring corrosion rates and assessing the condition of several structures in the harbors. Regardless of what is

causing the accelerated corrosion, dock owners need to know if their steel is sound and at what point repairs are no longer viable and replacement is necessary. Knowing the rate of corrosion is critical to devising a set of best management practices for structures throughout the harbor.

Clark says none of the experts have seen this kind of corrosion elsewhere in the Great Lakes, but that doesn't mean the problem doesn't exist elsewhere. "Most people don't expect this type of corrosion in a freshwater harbor, so they may not be looking for it," he said. "That's why the panel strongly recommended that other Great Lakes ports and harbors be studied and their managers made aware of this issue."

The Wisconsin and Minnesota Sea Grant programs, the Duluth Seaway Port Authority, the U.S. Army Corps of Engineers, and the University of Minnesota-Duluth and its Natural Resources Research Institute sponsored the expert panel meeting. The panel's report is available at www.seagrant.wisc.edu/coastalhazards/ or by contacting Gene Clark at (715) 394-8472 or grclark@aqua.wisc.edu. —KS/



photos: Gene Clark



KNOW YOUR WATER LAB

River Studies Center, University of Wisconsin-La Crosse

www.uwlax.edu/biology/RiverCtr/

The River Studies Center was created in 1972 to focus on research and informational programs pertinent to the Upper Mississippi River and its related resources. Since its creation, the center has expanded its research program to other aquatic resources, including rivers, streams, lakes, and wetlands across Wisconsin, the Upper Midwest, and as far away as Antarctica and Russia. Research directed by center faculty addresses resource issues and environmental problems of pressing regional and national concern, such as environmental pollutants and contaminants that have caused widespread degradation of our aquatic resources. Nearly 100 graduate students and more than 250 undergraduates have participated in center research studies.

For additional information, contact Director Mark Sandheinrich, sandhein.mark@uwlax.edu.

UW-La Crosse undergraduate Sarah Dodge assists in sampling yellow perch from Lake Superior as part of a River Studies Center investigation of methylmercury production and transfer to benthic food webs in nearshore and wetland environments. The study is funded by UW Sea Grant.



Kris Rofhus

ASC

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Aquatic Sciences Chronicle

a joint newsletter from UW Sea Grant and UW Water Resources



CALENDAR OF EVENTS

MAY 23-27

International Association for Great Lakes Research's Annual Conference

Ann Arbor, Michigan
www.iaglr.org/conference/2005/

JUNE

Wisconsin's most troublesome residents will bear the glare of public attention throughout the month of June. The dirty deeds of zebra mussels, round gobies, purple loosestrife, and other floral and faunal thugs will be highlighted in events around the state during **Invasive Species Awareness Month**.

The month's activities are being organized by the Governor's Council on Invasive Species. For more information, contact Amy Staffen, The Nature Conservancy, (608) 251-8140 ext. 162, or astaffen@tnc.org. Or see www.invasivespecies.wi.gov/awareness.

JUNE 7-8

Great Lakes Fishery Commission's Annual Meeting

Niagra-on-the-Lake, Ontario
www.glfc.org

NEW PUBLICATIONS & REPRINTS

Now Available at the ASC Publications Store aqu.wisc.edu/publications/



Aquaculture Effluents and Waste By-Products: Characteristics, Potential Recovery, and Beneficial Reuse

by Steven E. Yeo, Frederick P. Binkowski and Joseph E. Morris
47 pages, paperback
\$15



Wisconsin's Great Lakes Shipwrecks: Dive Into Wisconsin's Past

Wisconsin Historical Society
DVD, \$20



"2,3,7,8-Tetrachlorodibenzo-p-dioxin Activation of the Aryl Hydrocarbon Receptor/Aryl Hydrocarbon Receptor Nuclear Translocator Pathway Causes Developmental Toxicity Through a CYP1A-Independent Mechanism in Zebrafish," Sara A. Carney, Richard E. Peterson and Warren Heideman, *Molecular Pharmacology*, 66(3), 2004 (WISCU-R-04-010)

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